GUIDELINES FOR HEARING AID FITTING FOR ADULTS

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Introduction

The aim of these protocols is to give guidelines to members of The Association of Independent Hearing Healthcare Professionals (AIHHP) to meet current, evidence based best practice standards when fitting hearing aids to adults in the independent practice setting.

Patient Journey

The standard patient journey shall consist of:

- Initial assessment and hearing aid selection
- Hearing aid fitting
- Follow up appointments during hearing aid trial
- Continuing aftercare

1. INITIAL ASSESSMENT

Duration of the initial assessment appointment should be between 60 and 90 minutes.

1.1 An otological history shall be taken to include duration and onset of hearing loss, unilateral or bilateral, presence of tinnitus, pain or discharge from ears, history of ear infections or operations on ears, history of noise exposure, family history of hearing loss and relevant medical conditions and therapy. Referral to a GP or an ENT consultant shall be initiated if indicated (please refer to BAA / BSHAA guidelines for further guidance on onward referral criteria)

1.2 A listening needs assessment shall be administered using an appropriate self-report questionnaire such as:

- Client Oriented Scale of Improvement (COSI) (Dillon, James & Ginis, 1997)
- Abbreviated Profile of Hearing Aid Benefit (APHAB) (Cox & Alexander, 1995)
- Glasgow Hearing Aid Benefit Profile (GHABP) (Gatehouse, 1999)
- Hearing Handicap Inventory for Adults (HHIA) (Newman, et al., 1990)
- Characteristics of Amplification Tool (COAT) (Sandridge & Newman, 2006)

An alternate evidence-based outcome measurement questionnaire may be utilised. The post hearing aid fitting version of the chosen questionnaire should be applied after the completion of the rehabilitation program, thereby assessing the outcome of hearing rehabilitation.

1.3 Otoscopic examination shall be performed following the British Society of Audiology (BSA) (2016, reviewed 2021) recommended procedures for ear examination. Video-otoscopy should preferably be used in addition to otoscopy.

1.4 Pure Tone Audiometry using air and bone conduction shall be performed following BSA recommended procedures BSA, (2018, for review 2023)

1.5 Tympanometry. shall be performed in accordance with BSA recommended procedures BSA,(2014, reviewed 2018) if deemed appropriate.

1.6 **Pre – fitting speech discrimination test**.

One of the following speech recognition or speech in noise tests should be performed using headphones or in an appropriately calibrated sound field. Thus, yielding useful information on the patient's speech discrimination; and the likely benefit of hearing aid rehabilitation. It will also be of assistance to the audiologist in recommending the appropriate hearing aid technology for the patient. The sound field test can be repeated with the patient wearing hearing aids (after a sufficient period of acclimatisation has occurred). Comparison of the pre and post hearing aid fitting speech test scores should show an increased ability to understand speech in quiet and in noise thus being a useful tool for validation. Refer to

individual test publisher's protocols as to the exact requirements to set up an appropriately calibrated sound field.

- AB Word Lists
- BKB Sentences
- Quick SIN
- Speech in Noise Test
- Hearing in Noise Test (HINT or HINTpro)

Another test which can be used is the Lisn-S spatial hearing in noise test, which is also delivered under headphones.

1.7 Once all the information has been gathered, the test results shall be explained to the patient and/ or significant other/ family member. Care should be taken to use language appropriate to the patient's level of understanding. Findings should be related to the patients' specific listening problems as identified in the listening needs assessment. Visual aids such as the audiogram with speech and everyday sounds superimposed can be of benefit.

1.8 Hearing aid selection and recommendation.

If the use of hearing aids is indicated, it is the responsibility of the audiologist to explain all the possible options open to the patient and to recommend the most appropriate system for the patient. Realistic expectations as to what can be achieved with hearing aid technology should be emphasised.

The audiologist's recommendation should take into account the following:

- Patient's audio metrical configuration
- Whether monaural, binaural CROS/ BICROS or bone conduction fitting is likely to be of benefit
- The hearing aid style RIC, OTE, BTE, ITE, ITC CIC, IIC or spectacle aid most likely to be suitable
- The electroacoustic and technical characteristics of the hearing aid, including venting, mould, or open fit configuration appropriate for the style chosen.
- The most suitable hearing aid features based on patient's listening environment, needs and expectations. Consideration should be given to features such as multichannel WDRC, directional microphones, volume control, multiple programs, adaptive noise reduction, feedback management, frequency lowering systems
- Patient's cosmetic preferences
- Patient's handling ability
- Cost and patient's budget

The patient should be given two or more options, if possible, from different manufacturers, and be shown samples of products. Variation may be required depending on clinical judgement. The reasons for the recommendation should be outlined.

When explaining the technical features of the hearing aids to the patient, it should be related to how features apply to their specific situation and how they will be of benefit to them.

Language should be used which is appropriate to the patient's level of understanding; the use of manufacturers' technical jargon such as 'stereo zoom' or 'multichannel adaptive directionality' should be avoided

1.10 Assistive listening devices

Peripheral devices relevant to the patient's listening needs should be discussed. Including:

- Remote controls
- Bluetooth connectivity
- Television and telephone connections
- Telecoil and loop systems
- Remote microphones or FM systems

This can be deferred to the follow up appointment if preferred.

1.11 Impressions should be taken if necessary, following recommended procedures. BSA (2013, reviewed 2018)

1.12 A written quotation should be provided to the patient with clear explanations of the trial period if applicable, terms and conditions of the practice and any other relevant information.

1.13 A written report should be sent to the referring clinician if applicable with the consent of the patient.

2. HEARING AID FITTING

The length of appointment for hearing aid fitting should be preferably 60 minutes or greater

2.1 Prior to the patient's arrival the hearing aids, moulds and accessories should be checked. A listening check should be performed on the hearing aids and it should be confirmed that all patient data has been entered into NOAH or the Practice Management System as appropriate.

2.2 Otoscopic examination should be performed to ensure the ear canal is free of wax or infection.

2.3 Physical fit of hearing aids / moulds or ear tips should be checked.

2.4 The hearing aids should be connected to the manufacturer's software using a NOAH link or manufacturers fitting interface.

2.5 A fitting method should be selected. Most manufacturers offer a choice of validated prescription procedures such as NAL-NL2 or DSL [i/o] for which there is an extensive published evidence base, or alternatively the manufacturers' proprietary fitting formula may be used.

2.6 The hearing aid should be programmed with the selected formula. The feedback manager should be run making sure that there is not an excessive reduction in gain.

2.7 **Verification and achieving prescribed real ear response**.

There is ample evidence base for the use of Real Ear Measurements (REM) routinely. Humes (2012) asserts that although the two largest audiology associations in the US ,ASHA and AAA recommend as best practice the use of Real Ear Measurement verification and outcome measurement validation, a significant number of audiologists do not use these measures. This is despite the use of 'best practice' guidelines coinciding with positive hearing aid outcomes. He does however add the caveat that further research is required to conclude that verification by REM is conclusively linked to successful outcomes. Mueller (2014) asserts that 20 to 35% of audiologists routinely use probe-microphone measurements.

Azah and Moore (2007) as cited in Dillon (2012, p.350) acknowledges that, although most manufacturers' software will allow programming to an approximate prescription target, the accuracy of the response can be very poor and can usually be improved by the clinician. To ensure accurate fitting the hearing aid response should be measured in the patient's ear with the use of Probe Microphone Measurements. This will take into consideration the individual acoustic effects of the patient's external acoustic meatus along with sound diffraction patterns arising from the head and the ear.

Mueller (2011) adapting figures from Kochkin (2010) measuring overall hearing aid success rates, claims that routinely incorporating procedures such as such as REM in the fitting protocol coincides with improved hearing aid outcomes.

Dillon,H (2012 p.101) asserts that estimated real-ear gain from coupler measurements always have significant inaccuracies, and that real-ear gain measurement is essential unless the predicted real ear gain by the fitting software is accurate to within 5dB.

Recent developments have seen some manufacturers incorporate in situ REMs into their respective software. Digiovanni and Pratt (2010) demonstrated that there can be significant variations between REMs calculated through the hearing aids and benchmark equipment. External independent clinical threshold measurement equipment remains at present the preferred real ear measurement method.

The purpose of verification should be to ensure that the following three outcomes have been achieved: soft sounds shout be audible, moderate speech should be comfortable and loud sounds should be tolerable.

1. Audibility should be ensured for soft speech sounds delivered at 50dB SPL

2. Moderate speech sounds should be comfortable and delivered at 65 or 70 dB SPL

3. Loud sounds should be comfortable and are normally delivered at 80 or 85 dB SPL

The patient's loudness discomfort level should not be reached. The adaptation manager should be set to 100% prior to the real ear measurement.

The BSA Guidance (2018, reviewed 2021) on the use of REM to verify the fitting of digital signal processing hearing aids should be used. They recommend that REM should be undertaken for all patients at the fitting appointment along the lines proposed by Gatehouse et al, (BAAS newsletter, 2001, issue 36).

'...Where a fitting rationale contains an acoustical target, each hearing aid should be verified by REM using an input stimulus appropriate for the hearing aid under test. Tolerances to the prescription rationale of +or_-5dB at frequencies of 250, 500, 1000 and 2000 Hz, and of + or -8 dB at 3000 and 4000Hz should be achieved in all cases. In addition, the slope in each octave should be within + or – 5dB/ of the target...'

It is important not to forget that matching a prescription target through REM is only a starting point in hearing aid rehabilitation. The final goal is to provide the clearest speech possible based on the hearing loss, along with loudness comfort in different environments, without adversely affecting sound quality (Dillon, H, 2012 p.353). Mueller(2014), citing Leavitt and Flexer (2012), purports that QuickSIN scores can be increased by up to 10 dB with some hearing aids by reprogramming from the manufacturer's target to a NAL target and verifying with probe mic measurements.

The BSA point out that reaching target may not be necessary if the patient does not accept the resultant response. Full restoration of audibility may result in reduced acceptance and reduced intelligibility. It is suggested that in such cases initially the acclimatisation/ adaptation toggle in the manufacturer's software be used to adjust the response, as it will generally preserve the frequency shaping. If this is not preserved it is proposed that the frequency gain controls be used.

Variations in the BSA protocols may be necessary as measuring equipment has developed since their publication. The stimulus used for verification is important. A dynamic stimulus such as the International Speech Test Signal (ISTS) has many advantages but the clinician will be limited by the signals provided by the practice equipment. This test signal was not available at the time of formulation of the BSA REM guidance.

2.8 **Visible Speech Mapping (VSM) may be used as an alternative or in addition to traditional REM.**

Moore, (2006) asserts that VSM improves accuracy in hearing aid fitting and verification. Beck and Duffy (2008) suggest that VSM, based on scientific principles, has many of the benefits of traditional REM and is intuitive for the patient.

They assert that as it is based on human speech, it is more relevant and easier to explain to the patient and significant others, as it measures, verifies, and demonstrates aided speech.

VSM uses a customised audibility area or speech banana which is a representation of the long-term average speech spectrum for the patient's hearing loss. Whilst it is easier for the patient to understand VSM has the disadvantage that it does not incorporate validated fitting prescriptions which is a requirement for some service commissioners. The hearing aid's

dynamic features such as directionality, noise reduction and feedback suppression can be demonstrated or verified if required using traditional REM or VSM.

3 FOLLOW UP SERVICES

3.1 General

In most cases, it takes a while for the patient to get used to the hearing system and to obtain full benefit of use.

The patient may also experience situations where the hearing system is not performing as expected. Therefore, follow-up visits shall be scheduled.

The purpose of the follow-up services is to assist the patient in adapting to the hearing system and if needed to perform further adjustment of the hearing aid settings. Several follow-up appointments should be included, finishing with advice on the long-term use of the hearing system.

3.1.1 Follow up appointments

Length of follow up appointments should be between 30 and 60 minutes dependent on the Audiologist's judgement. At least one follow up appointment should be offered to the patient after fitting. Some practitioners find this works well within the first 2 weeks of the hearing aid fitting and a second appointment within 4 weeks of the fitting. Others find a formal appointment works best after four to five weeks of acclimatisation, with an arrangement for an earlier review being put in place should the patient require it. Contact with the patient by phone, text, or email within a week of fitting has been found to be beneficial. Further review appointments should be arranged as appropriate.

- The patient's experience with the hearing aids should be evaluated. The degree of use, benefits and any problems relating to the hearing aids should be investigated.
- The patient's ability to adequately handle the hearing aids should be checked.
- Usage patterns should be confirmed with data logging where available.
- If needed, further adjustments of the amplification characteristics or hearing aid settings shall be performed to improve hearing system performance or patient acceptance
- The ear canals should be examined for signs of irritation or cerumen build up and the patient asked about the physical comfort of the aids.
- The second part of the auditory rehabilitation questionnaire (COSI, HHIA, APHAB or GHABP), should be completed and the scores compared with the pre-fitting questionnaire, thus evaluating the benefit. Check that the patients listening goals, needs and expectations have been met as far as possible.
- Repeat the Speech test that was performed in the initial assessment with the patient wearing the hearing aids. Compare the aided and unaided scores to evaluate benefit.

- Evaluate and advise on the use of assistive listening devices, if not already done so.
- Discuss appropriate listening strategies and give written information where applicable.
- Explain and evaluate findings with the patient and significant other where appropriate, and determine the need for further appointments
- Arrange six month or annual review and arrangements for on-going aftercare as appropriate.

3.2 Auditory training

- For patients with a long history of considerable hearing loss the full benefit of the hearing aids may only be reached by means of auditory training. Such training can be achieved using an appropriate computer based auditory training program such as LACE or sign posting the patient to auditory rehabilitation programmes if not available in house.

3.3 Maintenance and continuing aftercare

An appropriate maintenance plan should be discussed with the patient to include:

- Prompt access to service and repairs in the event of any hearing instrument fault
- Follow up appointments to check correct functioning of the hearing system should be scheduled as necessary
- Where appropriate regular re-assessment of the patient's hearing and adjustment of the hearing aid according to any changes in the patients hearing thresholds
- Purchase of batteries and accessories for the hearing system.

3.4 Patient evaluation of services

As part of continuing aftercare, it is suggested that the patient could be invited to take part in a satisfaction survey designed to measure the satisfaction with the services provided.

The collection of data should be carried out by means of an appropriate satisfaction questionnaire.

A means of auditing survey results should be implemented and any areas of improvement identified should be analysed and addressed by appropriate corrective actions.

3.5 If the patient approves a report should be forwarded to the patient's GP.

Note: Audiologists and Hearing Aid Audiologists should use their clinical judgement when applying best practice. This protocol is guidance for AIHHP members. Although care has been taken in preparing this document, AIHHP does not and cannot guarantee members' interpretation and application of the protocol and cannot be held responsible for any errors or omissions. AIHHP accepts no liability whatsoever for any loss or damage howsoever arising. In some jurisdictions and in the case of some commissioners of audiological services,

alternative standards may apply which may be obligatory: these guidelines are not intended to interfere with their adherence.

REFERENCES:

American Academy of Audiology, 2006. *Guidelines for the Audiological Management of Adult Hearing Impairment* [pdf] Washington DC: American Academy of Audiology. Available at: <Guideline for the Audiologic Management of Adult Hearing Impairment (audiology.org) [Accessed 24th January 2022].

American Speech-Language-Hearing Association, 1998. *Guidelines for Hearing Aid Fitting for Adults*. [htm] Rockville, MD: Available at: <http://www.asha.org/policy/GL1998-00012.htm>
[Accessed 24th January 2022].

Beck, D.L. and Duffy, J. (2008) *Visible Speech: A Patient-Centred Clinical Tool Hearing Review* [online] Available at: <http://www.hearingreview.com/practice-management/16377-visible-speech-a-patient-centered-clinical-tool>
[Accessed 21 January 2013].

British Academy of Audiology, November 2016, Due for review November 2021. *Guidelines for O*nward Referral of Adults with Hearing Difficulty Directly Referred to Audiology Services. [pdf] Produced by Service Quality Committee of the British Academy of Audiology, Hanna Jeffery, Suzanne Jennings, Laura Turton: British Academy of Audiology. Available at: Guidelines for the Onward Referral of Patients Directly Referred to the Audiology Department (baaudiology.org)
[Accessed 24th January 2022].

British Society of Hearing Aid Audiologists, 2014. *Code of Practice*. [pdf] Great Dunmow: British Society of Hearing Aid Audiologists. Available at: https://bshaa.org/wp-content/uploads/2020/05/bshaa_code_practice_0914.pdf
[Accessed 24th January 2022].

British Society of Audiology Date: August 2018 Due for review: 2023
Pure-tone air-conduction and bone conduction threshold audiometry with and without masking. Available at:
www.thebsa.org.uk/wp-content/uploads/2018/11/OD104-32-Recommended-Procedure-Pure-Tone-Audiometry-August-2018-FINAL.pdf
Front page (thebsa.org.uk)
[Accessed 12th January 2022]

British Society of Audiology Date: November 2016 Due for review: November 2021
Ear examination. Available at:
www.thebsa.org.uk/wp-content/uploads/2016/04/OD104-54-Recommended-Procedure-Ear-Examiniation-Sept-2016.pdf
Front page (thebsa.org.uk)
[Accessed 12th January 2022]

British Society of Audiology Date of version: May 2018 Date for review: May 2021
Guidance on the verification of hearing devices using probe microphone measurements. Available at: www.thebsa.org.uk/wp-content/uploads/2018/05/REMS-2018.pdf

Front page (thebsa.org.uk)
[Accessed 12th January 2022]

British Society of Audiology. Date: February 2013 Due for review: Feb 2018 Recommended Procedure Taking an aural impression. Available at: www.thebsa.org.uk/wp-content/uploads/2013/04/OD104-33-Recommended-Procedure-Taking-an-aural-impression-3.pdf
Front page (thebsa.org.uk)
[Accessed 12th January 2022]

British Society of Audiology Date of version: August 2013 Date for review: August 2018 Tympanometry. Available at: www.thebsa.org.uk/wp-content/uploads/2013/04/OD104-35-Recommended-Procedure-Tympanometry-.pdf
Front page (thebsa.org.uk)
[Accessed 12th January 2022]

Cox, R., and Alexander, G.C. (1995) *The Abbreviated Profile of Hearing Aid Benefit* (APHAB). Ear & Hear, 16(2):176-186.

Digiovanni, J.J. and Pratt, R.M,, 2010. *Verification of in situ thresholds and integrated real-ear measurements*. Journal American Academy of Audiology, [online] Available at: <http://www.ohio.edu/people/digiovan/2010%20-%20DiGiovanni%20and%20Pratt%20-%20JAAA%20-%20Verification%20of%20in%20situ%20thresholds%20and%20integrated%20real-ear%20measurements.pdf>
[Accessed 21 January 2013].

Dillon, H., 2012, Hearing aids 2nd ed, Sydney: Boomerang Press

Dillon, H. and Ginis, J 1997. *Client Oriented Scale of Improvement (COSI) and its relationship to several other measures of benefit and satisfaction provided by hearing aids.* J Amer Acad Audiology, 8(1):27-43.

European Committee for Standardisation, (CEN), 2010. European standard EN15927, Services offered by hearing aid professionals. Brussells: CEN.
[Accessed 12th January 2022]

Gatehouse, S. (1999) *Glasgow Hearing Aid Benefit Profile (GHABP): derivation and validation of a client-centred outcome measure for hearing aid services.* J Amer Acad Audiolo, 10(2):80-103.

Health & Care Professions Council, Standards of Proficiency, Hearing Aid Dispenser. Date of version: September 2014, due for Review 2020. Available at: https://www.hcpc-uk.org/globalassets/resources/standards/standards-of-proficiency---hads.pdf?v=637106257170000000
[Accessed 24th January 2022].

Humes, L.E.,2012. *Verification and Validation: the Chasm between Protocol and Practice* The Hearing Journal, [online] Available at: <http://audiology.com/Cover_story__Verification_and_Validation__The.1.pdf>
[Accessed 7 January 2013].

Moore, B.C.J., 2006. *The value of speech mapping in hearing aid fitting.* Hearing Journal, [online] Available at :

<http://www.otometrics.com/~/media/DownloadLibrary/Otometrics/PDFs/Knowledge%20center%20content/Fitting%20content/speech-mapping-hearing-aid-fitting.pdf>
[Accessed 13 January 2013].

Mueller, G., 2011. *Hearing Literature in Review –Best of 2010*. Audiology online, [online] Available at: <http://www.audiologyonline.com/articles/20q-hearing-aid-literature-in-821>
[Accessed 4 January 2013].

Mueller, G. 2014. *Real-Ear Probe-Microphone Measurements-30 years of progress.* Audiology online. [online] Available at: http://www.audiologyonline.com/articles/20q-probe-mic-measures-12410 [Accessed 25 February 2014].

Newman, C., Weinstein, B., Jacobson, G. and Hug, G, (1990) *The Hearing Handicap Inventory for Adults (HHIA): Psychometric adequacy and audiometric correlates,* Ear & Hear, 11:430-433., S.A. and Newman, C.W., *Improving the Efficiency and Accountability of the Hearing Aid Selection Process - Use of the COAT*. Audiology online, [online] Available at: http://www.audiologyonline.com/articles/improving-efficiency-and-accountability-hearing-995
[Accessed 20 June 2013].

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